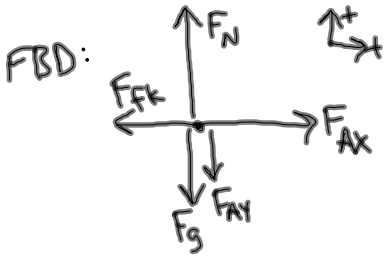
A box of mass 10 kg is being pushed across a horizontal surface by a force of 35 N at an angle of 30° S of E. If the coefficient of friction is 0.288, what is the acceleration of the box?



$F_{AX} = F_A \cos(30°)$
$= 30.31\,N$

$F_{AY} = F_A \sin(30°)$
$= 17.5\,N$ downwards

$$\Sigma F_x = ma_x$$

$$a_x = \frac{\Sigma F_x}{m} = \frac{F_{AX} - F_{fk}}{m}$$

$$= \frac{30.13\,N - 33.26\,N}{10\,N}$$

$$= -.316\ m/s^2$$

$$F_{fk} = \mu_k F_N$$
$$= (.288)(115.5\,N)$$
$$= 33.26\,N$$

$$\Sigma F_y = ma_y \rightarrow 0$$

$$F_N - F_g - F_{AY} = 0$$

$$F_N = F_g + F_{AY}$$
$$= 98N + 17.5N$$
$$= 115.5\,N$$

$F_g = mg$

TEST Thursday

HW due tomorrow

Fundamental Forces:

- Gravitational:
  - Weakest force
  - Acts over the longest distance
  - Anything with mass has gravitational force
- Electromagnetic:
  - Acts on charged particles
  - Medium-strength
- Strong Nuclear:
  - Acts over very short distances (1E -15 m)
  - Strongest force
- Weak Nuclear:
  - Acts over very, very short distances (.001 E -15 m)
  - Helps to hold nucleus together

Arnold Strongman and Suzie Small pull on opposite ends of a rope in a tug of war. The greatest force exerted on the rope is by

a) Arnold

b) Suzie

c) ... both the same

(Assume the rope's mass is negligible.)

- Tension on rope is same for both people.
- Forces come in pairs.

IF A MACK TRUCK AND A VOLKSWAGEN HAVE A HEAD-ON COLLISION, WHICH VEHICLE WILL EXPERIENCE THE GREATER IMPACT FORCE?

a) THE MACK TRUCK

b) THE VOLKSWAGEN

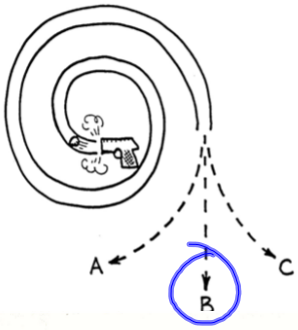
c) BOTH THE SAME

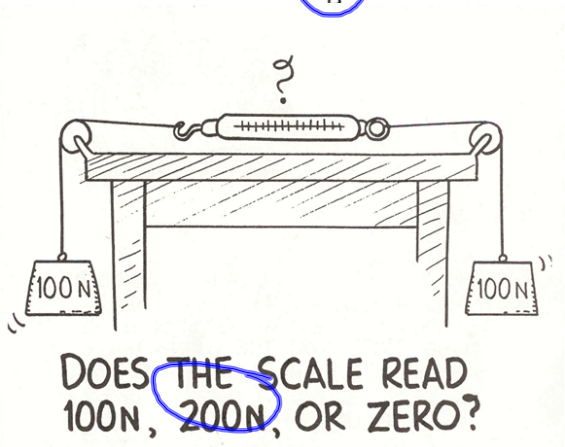
d) ... IT DEPENDS ON OTHER FACTORS

- Newton's Third Law:

forces come in pairs

WHEN THE PELLET FIRED INTO THE SPIRAL TUBE EMERGES, WHICH PATH WILL IT FOLLOW? (NEGLECT GRAVITY)

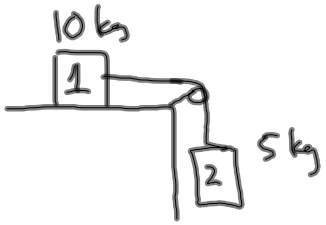




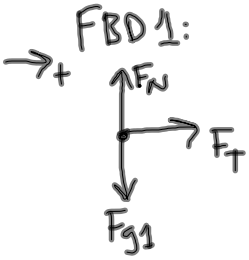
DOES THE SCALE READ 100N, 200N, OR ZERO?

Pulley I Problem:

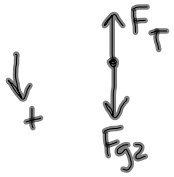
One block is on a frictionless surface and has a mass of 10 kg. A second block is attached by a rope over a pulley and is hanging, and has a mass of 5 kg. When they are released, what is their acceleration?



FBD 1:



FBD 2:



Boxes have same:
- F_T
- acceleration

$$\Sigma F_{1x} = m_1 a \qquad \Sigma F_{2y} = m_2 a$$

$$F_T = m_1 a \qquad F_{g2} - F_T = m_2 a$$

$$F_{g2} - m_1 a = m_2 a$$

$$m_1 a + m_2 a = F_{g2} = m_2 g$$

$$a(m_1 + m_2) = m_2 g$$

$$a = \frac{m_2 g}{m_1 + m_2}$$

$$= \frac{(5\text{ kg})(9.8\text{ m/s}^2)}{10\text{ kg} + 5\text{ kg}}$$

$$\doteq 3.27\text{ m/s}^2$$